REMARKS

These Remarks are in reply to the Office Action mailed October 19, 2005. Claims 1-26 were pending in the Application prior to the outstanding Office Action. No claims are being amended, canceled or added at this time. Accordingly, claims 1-26 remain pending for the Examiner's consideration. Based on the following remarks, Applicant respectfully requests reconsideration and withdrawal of the outstanding rejections and objections.

I. Provisional Non-Statutory Double Patenting Rejection

Claims 21-23 were provisionally rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1, 10 and 15 of co-pending U.S. Patent Application No. 10/620,971 (it is noted that the Office Action mistakenly listed this application as 10/690,971). Claim 1 of the '971 application has been amended to state that "wherein the at least one servo demodulation parameter that is different in the second set than the corresponding parameter in the first set comprises at least one of the following a starting automatic gain control (AGC) value; a starting phase lock loop (PLL) value; an automatic gain control (AGC) update value; a phase lock loop (PLL) update value; a bit-detection threshold; and a SAM confidence threshold." Claims 10 and 15 of the '971 application depend from claim 1. Applicant respectfully asserts that the above mentioned amendment to claim 1 of the '971 application renders this obviousness-type double patenting rejection moot. Accordingly, Applicant respectfully requests that this rejection be reconsidered and withdrawn.

Claims 21-23 were also provisionally rejected under the judicially created doctrine of obviousness-type double patenting as allegedly being unpatentable over claims 1, 10 and 15 of co-pending U.S. Patent Application No. 10/620,818. Claim 1 of the '818 application has been amended to state that "wherein the at least one servo demodulation parameter that is different in the second set than the corresponding parameter in the first set comprises at least one of the following a starting automatic gain control (AGC) value; a starting phase lock loop (PLL) value; an automatic gain control (AGC) update value; a phase lock loop (PLL) update value; a bit-detection threshold; and a SAM confidence threshold." Claims 10 and 15 of the '818 application

depend from claim 1. Applicant respectfully asserts that the above mentioned amendment to claim 1 of the '818 application renders this obviousness-type double patenting rejection moot. Accordingly, Applicant respectfully requests that this rejection be reconsidered and withdrawn.

II. Allowable Subject Matter

Applicant thanks the Examiner for indicating that claims 3-6 and 24-26 would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. However, as explained below, Applicant believes that the claims from which claims 3-6 and 24-26 depend are allowable, and thus, that claims 3-6 and 24-26 need not be rewritten as suggested.

Applicant also thanks the Examiner for indicating that claims 7-20 are allowed.

III. Summary of Prior Art Rejections

Claims 1 and 2 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over U.S. Patent No. 5,796,535 to Tuttle et al. (hereafter "Tuttle") in view of U.S. Patent Application Publication No. 2004/0190646 A1 to Aziz (hereafter "Aziz")

Claim 22 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Aziz in view Tuttle.

Claims 22 and 23 were rejecter under 35 U.S.C. §102(e) as allegedly being anticipated by Aziz.

IV. Summary of Claimed Invention

As explained in paragraph [0107] of the present application, even though most modern disk drives use zone bit recorded disks, modern disks drives do not typically use zone bit recorded servo wedges. Rather, modern disk drives sample at two different frequencies during the same track, one frequency for data fields, and a second frequency for servo wedges. This has been accomplished using two channels, or one channel essentially operating as two channels by switching between servo and data modes. Thus, even though the frequency associated with the data fields in modern disk drives is

dependent on which zone the data field is within, the frequency associated with all of the servo wedges may be the same, regardless of which zone the servo wedge is in.

As explained in paragraph [0108] of the present application, it is believed that a main reason why servo wedges are not generally zone bit recorded is because it is difficult to demodulate a servo wedge unless the appropriate demodulation frequency is known beforehand. However, there would be many advantages to zone bit recording the servo wedges, which are enumerated in paragraph [0108].

As explained in paragraph [0111] of the present application, FIG. 13 of the present application is a high level diagram of an exemplary disk drive device 1302, which can implement embodiments of the present invention. As shown in FIG. 13, the read/write channel 413' includes a pair of servo demodulators 404A and 404B, and a pair of paths 412A and 412B. This can alternatively be thought of a pair of channels 413 (e.g., a channel 413A and a channel 413B).

As explained in paragraph [0112] of the present application, so long as the zone location (i.e., which zone) of a head is know at a first point in time, it is relatively easy for the microprocessor to narrow down which zone the head will be in, at a next point in time, to two zones. For example, referring to FIG. 12 of the present application, if the head 414 is known to be in (or more specifically, over) the inner most zone 1210A during a first point in time t1, it can be predicted that the head 414 will either still be in the first zone 1210A or will be in the adjacent second (i.e., the next most inner) zone 1210B at a second point in time t2, assuming the difference between times t1 and t2 is sufficiently small. For another example, if the head is known to be in the second zone 1210B during a time t3, and to be moving radially outward from a point in time t3 to a point in time t4, it can be predicted that the head 414 is either still within the second zone 1210B or within the adjacent third zone 1210C at time t4, assuming the difference between times t3 and t4 is sufficiently small. The difficulty is in determining in which of the two most likely zones the head 414 is actually located, especially when the head is near the boundary between two adjacent zones.

The system of claim 1 of the present application searches for a servo address mark (SAM) pattern using both a first nominal frequency and a second nominal frequency, so that the SAM pattern can be detected in a first zone (if the head is over the first zone) or a

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second zone (if the head is over the second zone), thereby enabling the servo wedges to be zone bit recorded. More specifically, in the system of claim 1, "a first servo demodulator [is] adapted to search for a servo address mark (SAM) pattern, within a servo wedge, at a first nominal frequency useful for searching for the SAM pattern if the servo wedge is within a first zone; and a second servo demodulator [is] adapted to search for the SAM pattern, **within the same servo wedge**, at a second nominal frequency useful for searching for the SAM pattern if the servo wedge is within the second zone."

V. Discussion of Rejected Claims

Claims 1 and 2

Claim 1 is reproduced below for the convenience of the Examiner.

> *1. A servo demodulation system for use with a disk having zone bit recorded servo wedges, comprising:*
>
> *a first servo demodulator adapted to search for a servo address mark (SAM) pattern, within a servo wedge, at a first nominal frequency useful for searching for the SAM pattern if the servo wedge is within a first zone; and*
>
> *a second servo demodulator adapted to search for the SAM pattern, **within the same servo wedge**, at a second nominal frequency useful for searching for the SAM pattern if the servo wedge is within the second zone. (emphasis added)*

It was asserted in the Office Action that FIGS. 3 and 7, along with column 15, lines 42-54, column 11, lines 34-46 and line 63-67, and column 12, lines 44-67 "teaches an arrangement and corresponding method that searches for a SAM pattern at a first nominal frequency when the SAM is in a first zone and searches for a SAM pattern at a

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second nominal frequency when the pattern is in a second zone." (See page 5 of Office Action.) As explained above, this is not what the invention is about. Rather, in the claimed invention, the SAM pattern is searched for **within a same servo wedge** at both a first nominal frequency as well as a second nominal frequency, which will enable the SAM pattern to be detected so long as the servo wedge is within one of the two zones that correspond to the two nominal frequencies. This way, if the system is not sure of which zone the servo wedge being searched is within (e.g., because the head is near the boundary of two adjacent zones), the SAM pattern can still be detected.

Further, it was asserted in the Office Action that Tuttle's "use of shadow registers which store control values based on zones" teach the above mentioned features of claim 1 since such values can allegedly include "sampling frequencies in which the servo mark detector (A126) operates." (See page 5 of Office Action.) For at least the following reasons, Applicant respectfully disagrees that Tuttle teaches the features of claim 1.

Column 15, lines 42-52 of Tuttle discusses that when searching for the servo address mark (SAM), the analog receive filter 20 and the discrete equalizer filter 26 are first initialized with the calibration values corresponding to the highest data rate of the inner zone (which is typically the user data rate). However, this does not mean that the SAM is searched for, **within the same servo wedge**, at both a first nominal frequency (useful for searching for the SAM pattern if the servo wedge is within a first zone) and a second nominal frequency (useful for searching for the SAM pattern if the servo wedge is within a second zone), as required by claim 1.

Column 11, lines 34-46 of Tuttle discusses that the "timing recovery circuit 28 of FIG. 7", which includes a timing recovery variable frequency oscillator (VFO), is adjusted by a control signal B161. This portion of Tuttle also explains that the "shadow registers (B165a, B165b) control the operating range of the timing recovery VFO B164 corresponding to the channel data rate (CDR) of the current zone." More specifically, shadow register B165a, which is labeled "CDR_USER", stores a channel data rate (CDR) for user data; and shadow register B165b, which is labeled "CDR_SERVO", stores a channel data rate (CDR) for servo data. The use of such pairs of shadow registers (i.e., one register for user data, and another for servo data) enables the circuitry, such as timing control circuitry 28 of FIG. 7, to switch between a channel data rate (stored in register

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B165a) appropriate for reading user data, and another channel data rate (stored in register B165b) appropriate for reading servo data. As explained at column 10, lines 37-39, "this is necessary because the servo data is recorded at a different rate than the user data across the zones." Accordingly, it is clear that Tuttle is not using the shadow registers to enable the servo address mark detector A126 of FIG. 3 to search for the SAM pattern, **within the same servo wedge**, at both a first nominal frequency (useful for searching for the SAM pattern if the servo wedge is within a first zone) and a second nominal frequency (useful for searching for the SAM pattern if the servo wedge is within a second zone), as required by claim 1. Rather, Tuttle switches between two different read frequencies when switching between reading user data (of a data sector) and servo data (of a servo wedge), as explained at column 11, lines 47-49.

At column 11, lines 63-67, Tuttle states that "[t]he initial values for the shadow registers are determined through a calibration procedure which measures the optimum setting for each zone" and that "[w]hen the read head passes into a new zone, the calibrated setting corresponding to the new zone are loaded into the shadow registers." However, this merely means that the channel data rate for user data (stored in shadow register B165a) and the channel data rate for servo data (stored in shadow register B165b) are updated (i.e., changed) when the read head moves **from one zone to another**. This is quite different than searching for the SAM pattern, **within the same servo wedge**, at both a first nominal frequency (useful for searching for the SAM pattern if the servo wedge is within a first zone) and a second nominal frequency (useful for searching for the SAM pattern if the servo wedge is within a second zone), as required by claim 1.

Column 12, lines 44-67 of Tuttle, which continues to discuss the timing recovery circuit 28 of FIG. 7, states that the output of the timing recovery VFO controls the sampling clock of sampling device 24. This portion of Tuttle also states that "before acquiring the acquisition preamble (68.5) the phase-lock-loop first locks onto a predetermined nominal sampling frequency for the zone where the current track is located." This means that the phase-lock-loop will utilize a predetermined nominal sampling frequency when attempting to acquire a preamble, and that the predetermined nominal sampling frequency is based on the zone of the current track. However, this may not work if the read head is near the boundary between two adjacent zones, thus resulting in

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the timing recovery circuit 28 not being sure of which of the two adjacent zones the read head is over (and thus, not being sure of which predetermined nominal frequency to sample at). In contrast, with the invention of claim 1, so long as the servo demodulation system can narrow down the possible zones (over which the read head is over) to two zones, the SAM pattern can be searched for, **within the same servo wedge**, at both a first nominal frequency (useful for searching for the SAM pattern if the servo wedge is within a first zone) and a second nominal frequency (useful for searching for the SAM pattern if the servo wedge is within a second zone), thereby enabling the SAM pattern to be detected regardless of which of the two adjacent zones the read head is over.

It was alleged in the Office Action that the only deficiency of Tuttle was that it does not teach the use of separate detectors, as set forth in claim 1. While Applicant agrees that Tuttle does not teach the use of separate detectors, Applicant also asserts that for at least the above explained reasons Tuttle does not teach that a SAM pattern is searched for, **within the same wedge**, at both a first nominal frequency (useful for searching for the SAM pattern if the servo wedge is within a first zone) and a second nominal frequency (useful for searching for the SAM pattern if the servo wedge is within a second zone), as required by claim 1.

It asserted in the Office Action that FIG. 6 of Aziz, which shows two separate SAM detection logic units 603(a) and 603(b), along with operation of digital post filter equalizer 508 "at plural frequencies ... provides an improved detection performance." (See page 5 of Office Action). For at least the following reasons, Applicant respectfully asserts that Aziz does not teach the claimed invention, alone, or in combination with Tuttle.

While it is true that Aziz does show two separate "SAM detection logic" units, they are not used to search for the SAM pattern, **within the same wedge**, at both a first nominal frequency (useful for searching for the SAM pattern if the servo wedge is within a first zone) and a second nominal frequency (useful for searching for the SAM pattern if the servo wedge is within a second zone), as required by claim 1. Rather, as explained in paragraph [0038] of Aziz, "SAM detection logic 603(a) detects the SAM based on the unfiltered path output of data detector 507, while SAM detection logic 603(b) detects the SAM based on the filtered path output of data detector 509." As explained in paragraph

[0036] of Aziz, the digital post filter equalizer 508 (of the filtered path) "is employed to post-process the sample sequence from data phase selector 506 for improved performance of the SAM detector ... and Grey code detector." More specifically, the digital post filter equalizer 508 is a digital realization of a finite impulse response (FIR) filter, or an infinite impulse response filter (IIR), as also explained in paragraph [0036] of Aziz. However, there is absolutely **no teaching or suggestion** that one SAM detection logic 603(a) searches for the SAM pattern, within a servo wedge, at a first nominal frequency useful for searching for the SAM pattern if the servo wedge is within a first zone, whereas the other SAM detection logic 603(b) searches for the SAM pattern, **within the same servo wedge,** at a second nominal frequency useful for searching for the SAM pattern if the servo wedge is within the second zone. Accordingly, Applicant respectfully asserts that Aziz does not teach the deficiencies of Tuttle.

For at least the reasons discussed above, Applicant respectfully asserts that Tuttle and Aziz, alone or in combination, do not teach the features of claim 1. Accordingly, Applicant respectfully requests that the rejections of independent claim 1, and its dependent claim 2, be reconsidered and withdrawn.

Claims 21-23

Applicant believes that claim 21, and its dependent claims 22 and 23, are patentable for similar reasons to those discussed above with regards to claim 1. Accordingly, Applicant respectfully requests that the rejections of these claims be reconsidered and withdrawn.

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VI. Conclusion

In light of the above, it is respectfully requested that all outstanding rejections and objections be reconsidered and withdrawn. The Examiner is respectfully requested to telephone the undersigned if he can assist in any way in expediting issuance of a patent.

The Commissioner is authorized to charge any underpayment or credit any overpayment to Deposit Account No. 06-1325 for any matter in connection with this response which may be required.

Respectfully submitted,

Date: December 13, 2005

By: Jeffrey R. Kurin

Jeffrey R. Kurin
Reg. No. 41,132

Customer No. 23910
Fliesler Meyer LLP
Four Embarcadero Center, Fourth Floor
San Francisco, California 94111-4156
Telephone: 415/362-3800
Facsimile: 415/362-2928